

Chapman 15 Puzzle Documentation

Joanna Whittam (15319524), March 10th 2017

Class Methods:

```
public Chapman_15_Puzzle();
```

This is the constructor for the class. It initialises the board, shuffles it and prints both the board & instructions to the screen.

```
private void locateBL();
```

BL is the BLank space. This method iterates through the board and finds the coordinates of the BL. It is called at the end of shuffle().

```
public void shuffle();
```

As the name suggests, this is a method to shuffle the board. Random numbers are generated using the Random class, in order to randomly choose which pieces to swap. It's called from the constructor so that the game begins with a shuffled board.

```
private boolean isSolved();
```

This iterates through the board, comparing each piece to the same position in SOLVED_BOARD. If any difference is found, it returns false.

```
private void printBoard();
```

This iterates through the board, printing each piece to the console. It's called every time the player makes a move.

```
private boolean isValidInstruction(String instruction);
```

This compares the instruction passed in with each of the hard coded instructions (UP, DOWN, etc.). If it is the same as any then it is valid.

```
private boolean isValidMove(String instruction);
```

First this method calls isValidInstruction(). If this is true, and the player is not trying to move the blank space into the edge of the board, then the move is valid.

```
public void playerMove(Scanner player_in);
```

This asks the player to make a move and reads in their instruction from the console. It loops until the player enters a valid move - determined by calling isValidMove(). Once they enter a valid move, move() is called. The board is reprinted to the console also.

```
private void move(String instruction) ;
```

This method presumes that the instruction given is valid since it's called from the `playerMove()` method. The BL is swapped with the relevant piece and its coordinates updates accordingly.

```
public static int[] to1DIntArray(String oldArr[][]);
```

This reads in a 2D board and converts it to a 1D int array. It is used to create the correct array for use in the following two functions.

```
private static int inversions(int[] p,int low, int high);
```

This is called from `even_perm()` and returns the number of inversions in p.

```
public static boolean even_perm(int[] p);
```

This checks whether the passed in board (as an int array) can be solved or not.

```
public static void main(String arg0[]);
```

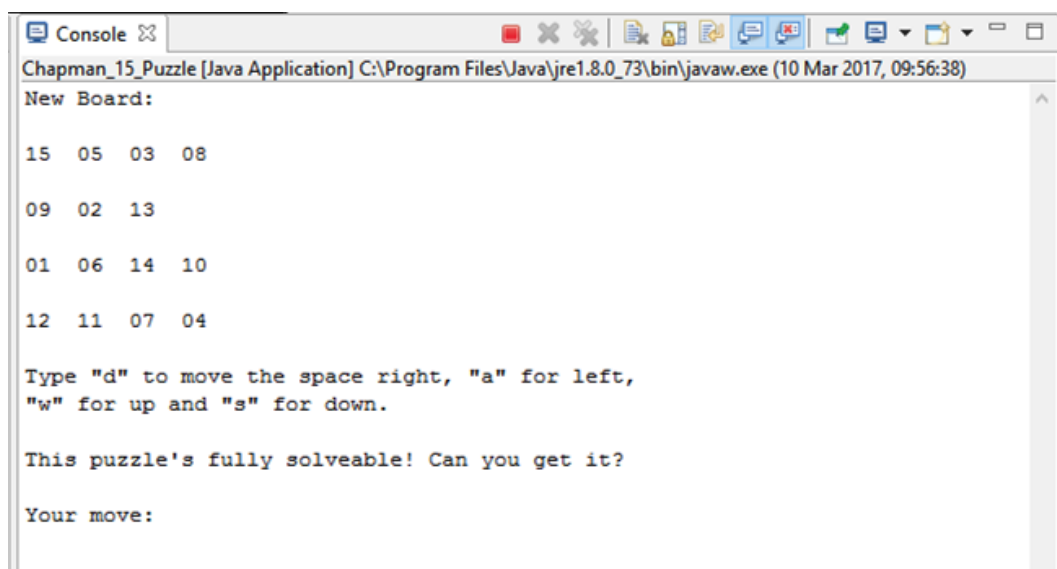
This creates a board and runs a single Chapman 15 puzzle. It can also call the testing function, but I've commented this out.

```
public static void testing();
```

This runs iterative tests for a number of the above functions.

The Puzzle in Progress:

Initial console output when the game begins:



```
Chapman_15_Puzzle [Java Application] C:\Program Files\Java\jre1.8.0_73\bin\javaw.exe (10 Mar 2017, 09:56:38)
New Board:

15  05  03  08

09  02  13

01  06  14  10

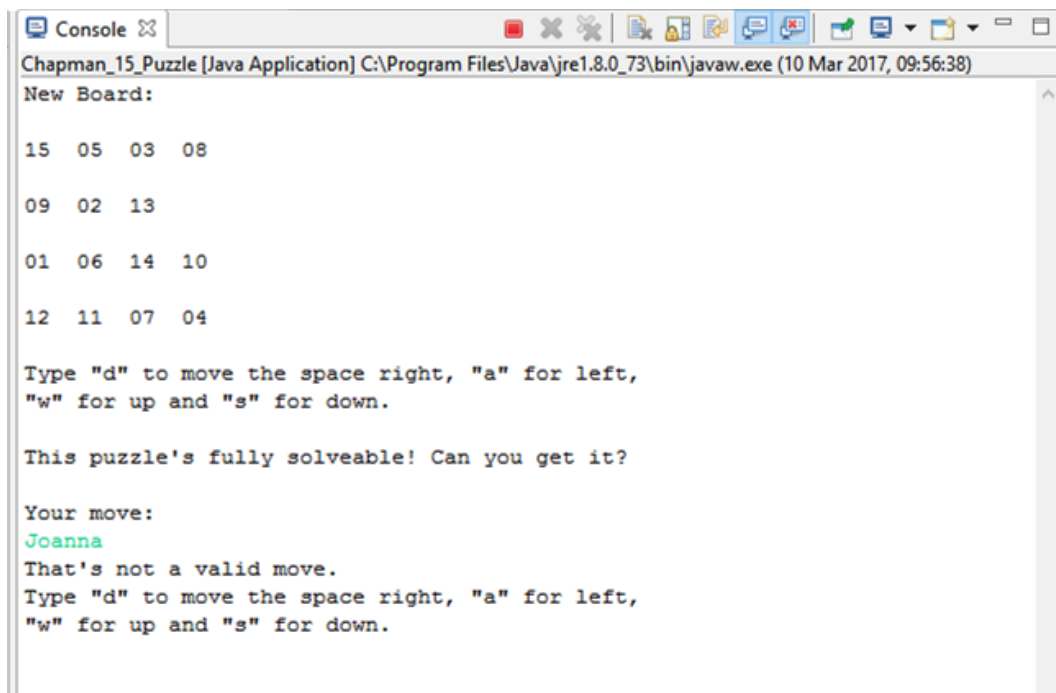
12  11  07  04

Type "d" to move the space right, "a" for left,
"w" for up and "s" for down.

This puzzle's fully solveable! Can you get it?

Your move:
```

Detecting an invalid move entered by the player: (invalid instruction)



```
Console [Java Application] C:\Program Files\Java\jre1.8.0_73\bin\javaw.exe (10 Mar 2017, 09:56:38)
New Board:

15  05  03  08

09  02  13

01  06  14  10

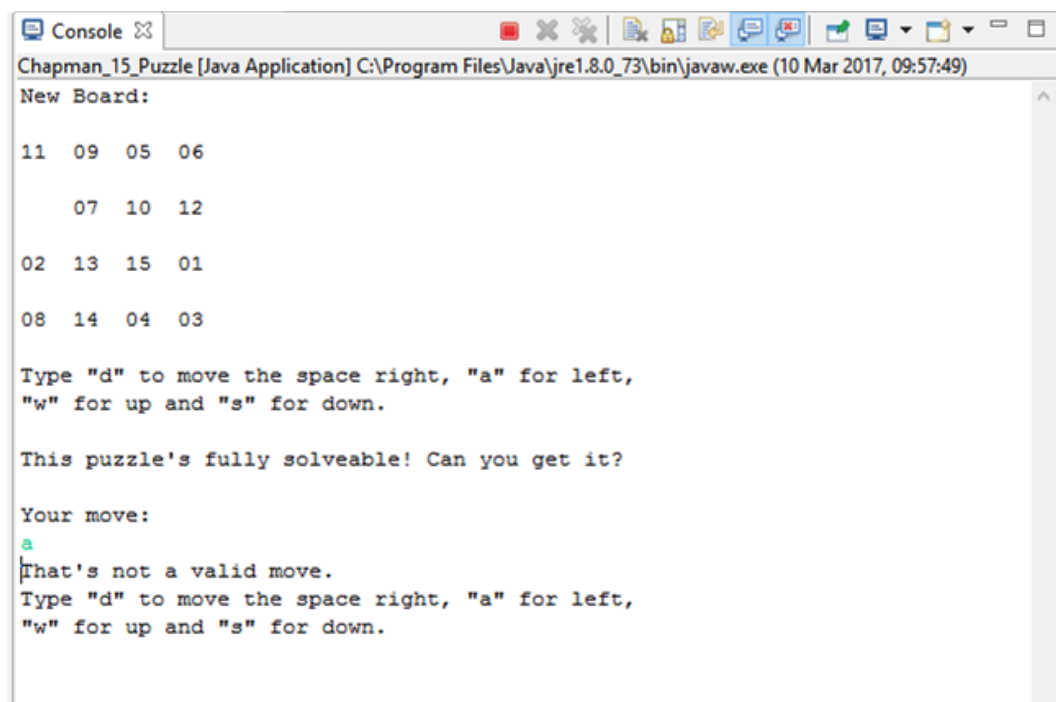
12  11  07  04

Type "d" to move the space right, "a" for left,
"w" for up and "s" for down.

This puzzle's fully solveable! Can you get it?

Your move:
Joanna
That's not a valid move.
Type "d" to move the space right, "a" for left,
"w" for up and "s" for down.
```

Detecting an invalid move entered by the player: (move cannot be made, player trying to move BL into edge of the board)



```
Console [Java Application] C:\Program Files\Java\jre1.8.0_73\bin\javaw.exe (10 Mar 2017, 09:57:49)
New Board:

11  09  05  06

    07  10  12

02  13  15  01

08  14  04  03

Type "d" to move the space right, "a" for left,
"w" for up and "s" for down.

This puzzle's fully solveable! Can you get it?

Your move:
a
That's not a valid move.
Type "d" to move the space right, "a" for left,
"w" for up and "s" for down.
```

Valid move :)

```
Console [Java Application] C:\Program Files\Java\jre1.8.0_73\bin\javaw.exe (10 Mar 2017, 09:57:24)
New Board:

05      11  06

09 08  03  12

15 07  01  02

04 14  13  10

Type "d" to move the space right, "a" for left,
"w" for up and "s" for down.

This puzzle's fully solveable! Can you get it?

Your move:
s
05 08  11  06

09      03  12

15 07  01  02

04 14  13  10

Your move:
```